

THE CLAIMS

What is claimed is:

1. A method of manufacturing an article which comprises:

5 providing a polyolefin/clay nanocomposite masterbatch formed from about 0 to 99 percent by weight of polyolefin, from about 1 to 100 percent by weight of functionalized polyolefin, and from about 10 to 50 percent by weight of an organically modified clay; melt blending from about 1 to 30 percent by weight of the nanocomposite masterbatch and from about 70 to 99 percent by weight of a polyolefin blend to form a final
10 polyolefin blend and to ensure sufficient exfoliation of the organically modified clay into the final polyolefin blend so that the melt strength of the final polyolefin blend is greater than the melt strength of the polyolefin blend before modification with the nanocomposite masterbatch; and forming the article using the final polyolefin blend.

15 2. The method of claim 1, wherein the masterbatch present in an amount from about 2 to 27 percent by weight and which comprises from about 50 to 80 percent by weight of polyolefin, from about 20 to 50 percent by weight of functionalized polyolefin, and from about 20 to 48 percent by weight of organically modified clay, and the polyolefin
20 blend present in an amount from about 73 to 98 percent by weight, are melt blended to form the final polymer blend which has a modified melt strength so that the ratio of the modified melt strength to the melt strength before modification measured at 220°C is at least about 1.5 but no more than about 15.

25 3. The method of claim 1, wherein the masterbatch present in an amount from about 3 to 25 percent by weight and which comprises from about 60 to 70 percent by weight of polyolefin, from about 30 to 40 percent by weight of functionalized polyolefin, and from about 30 to 45 percent by weight of organically modified clay, and the polyolefin
30 blend present in an amount from about 75 to 97 percent by weight are melt blended to form the final polyolefin blend which has a modified melt strength so that the ratio of the modified melt strength to the melt strength before modification measured at 220°C is at least about 1.6 but no more than about 14 and the final polyolefin blend has a shear viscosity that is at least about 5 times that of the shear viscosity of the polymer blend measured under the same conditions but without the organically modified clay.

4. A method of manufacturing an article which comprises a polyolefin/clay nanocomposite blend comprising:

combining from about 50 to 98 percent by weight of a polyolefin, from about 1 to 20 percent by weight of a functionalized polyolefin, and an organically modified clay in an amount sufficient to provide a modified melt strength, so that a ratio of the modified melt strength to the melt strength before modification measured at 220°C is at least about 1.5 but no more than about 15; and

forming the article using the polyolefin /clay nanocomposite blend.

5. The method of claim 4, wherein the polyolefin blend in the article comprises from about 70 to 95 percent by weight of polyolefin, from about 1 to 10 percent by weight of functionalized polyolefin, and from about 4 to 20 percent by weight of organically modified clay to provide a ratio of the melt strength of the modified blend to the melt strength of the blend before modification measured at 220°C of at least about 1.6 but no more than about 14.

6. The method of claim 4, wherein the polyolefin blend in the article comprises from about 85 to 92 percent by weight of polyolefin, from about 2 to 5 percent by weight of functionalized polyolefin, and from about 6 to 10 percent by weight of organically modified clay to provide a ratio of the melt strength of the modified blend to the melt strength of the blend before modification measured at 220°C of at least about 1.6 but no more than about 14.

7. The method of claim 1 wherein the forming comprises at least one of thermoforming, extrusion, melt spinning, blow molding or foam processing.

8. An article formed from a final polyolefin blend containing a polyolefin/clay nanocomposite masterbatch comprising:

from about 0 to 99 percent by weight of polyolefin, from about 1 to 100 percent by weight of a functionalized polyolefin, and from about 10 to 50 percent by weight of an organically modified clay, and any optional components,

wherein the final polyolefin blend comprises from about 1 to 30 percent by weight of the nanocomposite masterbatch and about 70 to 99 percent by weight of a polyolefin blend,

and wherein the organoclay is sufficiently exfoliated into the polyolefin blend to provide the final polyolefin blend with a modified melt strength so that the ratio of the modified melt strength to the melt strength before modification measured at 220°C is at least about 1.5 but no more than about 15.

9. The article of claim 8, wherein the masterbatch is present in an amount from about 2 to 27 percent by weight and comprises from about 50 to 80 percent by weight of polyolefin, from about 20 to 50 percent by weight of functionalized polyolefin, and from about 20 to 48 percent by weight of organically modified clay, and the polyolefin blend is present in an amount from about 73 to 98 percent by weight, to form the final polymer blend which has a modified melt strength so that the ratio of the modified melt strength to the melt strength before modification measured at 220°C is at least about 1.5 but no more than about 15.

10. The article of claim 8, wherein the masterbatch is present in an amount from about 3 to 25 percent by weight and comprises from about 60 to 70 percent by weight of polyolefin, from about 30 to 40 percent by weight of functionalized polyolefin, and from about 30 to 45 percent by weight of organically modified clay, and the polyolefin blend is present in an amount from about 75 to 97 percent by weight, to form the final polyolefin blend which has a modified melt strength so that the ratio of the modified melt strength to the melt strength before modification measured at 220°C is at least about 1.6 but no more than about 14 and the final polyolefin blend has a shear viscosity that is at least about 5 times that of the shear viscosity of the polymer blend measured under the same conditions but without the organically modified clay.

11. The article of claim 8, wherein the functionalized polyolefin comprises a homopolymer, copolymer, and/or mixture of ethylene and/or propylene, wherein a functional monomer with a pendant reactive polar group is grafted onto the polyolefin.

12. The article of claim 8, wherein the nanocomposite-modified polyolefin blend further comprises one or more optional additive components including nucleating agents, fillers, plasticizers, impact modifiers, colorants, mold release agents, lubricants, antistatic agents, pigments, fire retardants, and ultraviolet stabilizers, or mixtures thereof.

13. The article of claim 8, wherein the addition of the nanocomposite masterbatch provides a range of temperatures for forming the article that is at least about 10°C greater than without the inclusion of a sufficient amount of the clay nanocomposite.

14. An automotive component, a building material, a packaging material, an electrical material, or a nonwoven fabric or fiber comprising the article of claim 8.

15. An article formed from a modified polyolefin blend comprising from about 50 to 98 percent by weight of polyolefin, from about 1 to 20 percent by weight of functionalized polyolefin, and from about 1 to 30 percent by weight of organically modified clay that is sufficiently dispersed in the polyolefin and functionalized polyolefin to provide a modified melt strength that is greater than the melt strength of the blend before modification.

16. The article of claim 15, wherein the polyolefin blend comprises from about 70 to 95 percent by weight of polyolefin, from about 1 to 10 percent by weight of functionalized polyolefin, and from about 4 to 20 percent by weight of organically modified clay.

17. The article of claim 15, wherein the polyolefin blend comprises about 85 to 92 percent by weight of polyolefin, from about 2 to 5 percent by weight of functionalized polyolefin, and from about 6 to 10 percent by weight of organically modified clay.

18. The article of claim 15, wherein the polyolefin blend has a ratio of the melt strength of the modified blend to the melt strength of the blend before modification measured at 220°C of at least about 1.5 but no more than about 15.

19. The article of claim 15, wherein the polyolefin blend has a ratio of the melt strength of the modified blend to the melt strength of the blend before modification measured at 220°C of at least about 1.6 but no more than about 14.

20. The article of claim 15, wherein the organically modified clay comprises a reaction product of at least one organoclay and at least one swelling agent.

21. The article of claim 20, wherein the swelling agent comprises at least one of cationic surfactants; amphoteric surface active agents; derivatives of aliphatic, aromatic or arylaliphatic amines, phosphines and sulfides; organosilane compounds; protonated amino acids and salts thereof; and combinations thereof.

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